The nature and method of formation of anchor ice, which is also called ground ice or "ground-gru," has not yet been thoroughly investigated, as could easily be done, by laboratory experimentation, but the various hypotheses that have been advanced concerning its formation substantially agree in the idea that we have here a case of water cooled slightly below its freezing point and prevented from freezing by the rapid current of the river; when the eddies and movements of the water cease, or become sluggish, as at the bottom surface or behind any obstacle, then it freezes, and in so doing attaches itself to the obstacle as a nucleus or base which is usually, of course, considerably below the surface of the stream.

THE CHINOOK AND THE SIGNS OF ITS APPROACH.

In the Montana Weather Report for February, 1897, Mr. Coe says:

Generally an aurora is visible from twenty-four to sixty hours prior to the chinook, and a falling barometer is nearly always in evidence. A perfectly calm and a cloudless sky precedes its coming. The smoke from fires ascends perpendicularly, wavering now and then, as if undecided in the direction it should go, or hangs suspended in the motionless air, like a miniature cloud. There is an awesome hush; all nature seems to be resting. The mountains stand out in bold relief against the intensely blue sky, the glistening whiteness of their slopes relieved by the dark green of the pine groves, presenting a lovely view. Suddenly, from each sharp peak a horizontal streamer of snow is seen to unfurl. It is the colors at the front of the advancing host, and mankind in the valleys and plains below exclaim: "The chinook is coming!"

The clouds, which immediately form at the crest of the mountains in the oncoming rush of heated air, are identical in form and color at all times—a huge, billowy mass of vapor, which seems to have been condensed at the summit of the Rockies, and rapidly rolls down the length of the Marias Pass to the plains below, very quickly hiding the mountains from sight. Sometimes the southwest wind comes in a boisterous manner, with rush and roar, chasing the snow in long, drifting lines, but soon moistening it, so that in a few hours it becomes compact and looks as if the hot breath of a flame had passed over it. At other times the atmosphere seems to quiver with heat, and the gentle breeze comes creeping and sighing in light puffs, coquettishly chasing the snow in eddies around projections, and anon tossing it in fanciful shapes on high; eventually the wind increases in force, but never varies the smallest fraction of a degree in its direction. Sometimes, above a considerable tract of country, the chinook blows only at an elevation, and descends many miles to the eastward, even melting the snow on the Sweet Grass Hills (70 miles distant) to some extent, while no change is perceptible at this point. At other times, as at present, a well-defined chinook may be "in sight" on the mountains, and continue so for hours, while the temperature is near the zero mark at this station.

To illustrate this eccentricity of the meteorological phases, I cite the following extremes between two localities, but 38 miles apart: At Kipp, elevation 4,400 feet, time 8:15 p. m. (one hundred and fifth meridian), date February 13, the record is as follows: temperature 6°, wind northwest, clear, snow on ground 7 inches. At Summit, altitude 5,500 feet, a station at the head of the Marias Pass, on the Great Northern Railway, at the same time, the report is: temperature 39, wind southwest, dense clouds, snow on ground 3 feet, melting rapidly; like conditions for the past thirteen hours. At Kipp slight change occurred in temperature until it rose to 40° in twelve minutes at 2:10 p. m., February 15, 1897.

FROST FORMATIONS.

In the American Meteorological Journal for February, 1895, page 387, Vol. XI, there is an exceedingly interesting communication from Mrs. Edson relative to the formation on Roan Mountain, Tenn., of frost needles at the surface of gravelly soil. A physical explanation of the method of formation of the ice columns was given by the Editor in the same journal for April, 1863, Vol. IX, p. 523. The subject is one that lends itself to laboratory experimentation. A peculiar type of the formation is described in the January report of the Alabama section of the Climate and Crop Service, by Mr. Alexander M. Valerio, voluntary observer at Daphne, as follows:

On January 27 the minimum temperature at this station was 14°. The next morning, going down the hillside by my house I noticed, on the dry grass and low brush, what at first sight I took for snow and nearer for bunches of cotton, but which on closer examination I found to be frost work of a very peculiar shape and form, looking very much like fine stick or ribbon candy, or fine venetian glass. These ribbons, beautifully curled and feather-like, came out from the stubs of the plants and, from a sample which I inclose, you will notice the bark was taken off the plants. The width of the frost ribbon was as the length of the cracks in the plant. They looked like fine shavings of a very white wood and crumbled at the touch.

METEOROLOGICAL TABLES.

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For text descriptive of tables and charts see page 166 of REVIEW for April, 1897.